

## CLAIMS

What is claimed is:

1        1. A switch fabric for routing data from one or more sources towards one or more destinations,  
2 comprising a switching stage configured between an input stage and an output stage wherein:  
3        the input stage is configured to receive the data transmitted from the one or more sources and  
4 forward the data to the switching stage;  
5        the switching stage is configured to route the data received from the input stage to the output stage;  
6        the output stage is configured to transmit the data received from the switching stage towards the one  
7 or more destinations;  
8        the input stage comprises a plurality of input devices, each input device performing a port expansion  
9 function;  
10       the switching stage comprises one or more crossbar devices, each crossbar device performing a data  
11 routing function;  
12       the output stage comprises a plurality of output devices, each output device performing a port  
13 contraction function;  
14       each input device transmits bids to the one or more crossbar devices to request connections through  
15 the switching stage for routing the data to the output devices; and  
16       each crossbar device comprises:  
17        (1) a bid arbitrator configured to determine whether to accept or reject each received bid,  
18 wherein, in response to a collision between multiple bids, the bid arbitrator accepts two or more of the  
19 colliding bids in a single time slot; and  
20        (2) memory for storing one or more accepted cells for the same output device, wherein the  
21 crossbar device can transmit grant signals for two or more accepted bids for the same output device in a  
22 single time slot.

1        2. The invention of claim 1, wherein, for each crossbar device, a maximum number of accepted bids  
2 for each output device is equal to one plus a number of available memory spaces associated with that  
3 output device.

1        3. The invention of claim 1, wherein each output device has a cell shift register for each input  
2 device to provide resequencing of cells routed by different crossbar devices.

1        4. The invention of claim 1, wherein, for each crossbar device, a maximum number of accepted  
2 cells that can be stored in memory for each output device is greater than a maximum number of grant  
3 signals for that output device that can be transmitted in a single time slot.

1        5. The invention of claim 1, wherein each crossbar device has a different cell queue for each output  
2 device connected to that crossbar device, wherein the cell queue stores the one or more accepted cells for  
3 that output device.

1        6. The invention of claim 1, wherein each crossbar device has a different cell queue for each output  
2 device connected to that crossbar device, wherein a specified number of spaces in each cell queue is  
3 reserved for high-priority cells.

1        7. The invention of claim 1, wherein each output device has a different cell shift register for each  
2 crossbar device connected to that output device, wherein the shift register moves incoming cells one  
3 place per slot until an incoming cell is eligible to be transferred to an output port.

1        8. The invention of claim 1, wherein the switch fabric is fabricated as one or more integrated  
2 circuits.

1        9. A switch fabric for routing data from one or more sources towards one or more destinations,  
2 comprising a switching stage configured between an input stage and an output stage wherein:  
3        the input stage is configured to receive the data transmitted from the one or more sources and  
4 forward the data to the switching stage;  
5        the switching stage is configured to route the data received from the input stage to the output stage;  
6        the output stage is configured to transmit the data received from the switching stage towards the one  
7 or more destinations;

8        the input stage transmits bids to the switching stage to request connections through the switching  
9 stage for routing the data to the output stage; and

10       the switching stage comprises:

- 11       (1) a bid arbitrator configured to determine whether to accept or reject each bid; and  
12       (2) memory for storing one or more of the bids received from the input stage, wherein the bid  
13 arbitrator is configured to re-consider whether to accept a stored bid that was not accepted in a previous  
14 time slot.

1        10. The invention of claim 9, wherein:

2        the input stage comprises a plurality of input devices, each input device performing a port expansion  
3 function;

4        the switching stage comprises one or more crossbar devices, each crossbar device performing a data  
5 routing function;

6        the output stage comprises a plurality of output devices, each output device performing a port  
7 contraction function;

8        each input device is configured to transmit bids to the one or more crossbar devices to request  
9 connections through the switching stage for routing the data to the output devices;

10       each crossbar device is configured to determine whether to accept or reject each bid received from an  
11 input device and the transmit a grant/rejection signal to that input device identifying whether the bid is  
12 accepted or rejected; and

13       each crossbar device comprises:

14       (1) a bid arbitrator configured to determine whether to accept or reject each bid; and

15       (2) memory for storing one or more of the bids received from the input devices, wherein the bid  
16 arbitrator is configured to re-consider whether to accept a stored bid that was not accepted in a previous  
17 time slot.

18       11. The invention of claim 9, wherein the switch fabric is fabricated as one or more integrated  
19 circuits.  
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